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**PDC** 2000  
Professional Developers Conference

EXHIBIT C

the defining *point*

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# Application Center 2000: Ensuring Reliability/Availability of Web and Component Applications

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# Agenda...

- Application Center 2000 overview
- Distributed Application Monitoring
- WMI: the infrastructure of management of Windows DNA and .NET
- Managing and guaranteeing application availability with Application Center
  - Performance Management
  - Event Management
  - Health Monitor for automated "lights-out" recovery from application or system failures

# Scale-Out

- Software scale-out model works
  - Cost-effective using commodity hardware
  - Scalable by adding more servers
  - Highly reliable
- But...
  - Ongoing operational costs
  - Difficult to deploy apps
  - Difficult to monitor apps for proactive management
  - Difficult to test apps
- Application Center 2000:  
Lower cost & complexity of scale out

# AC 2000: Functional Overview

- Simple *Application* Management
  - Single application image
  - Deployment and synchronization
- Software Scaling Made Easy
  - On-demand scalability
  - Integrated load balancing management
- Mission-Critical Availability
  - No single point of failure
  - Performance and health monitoring

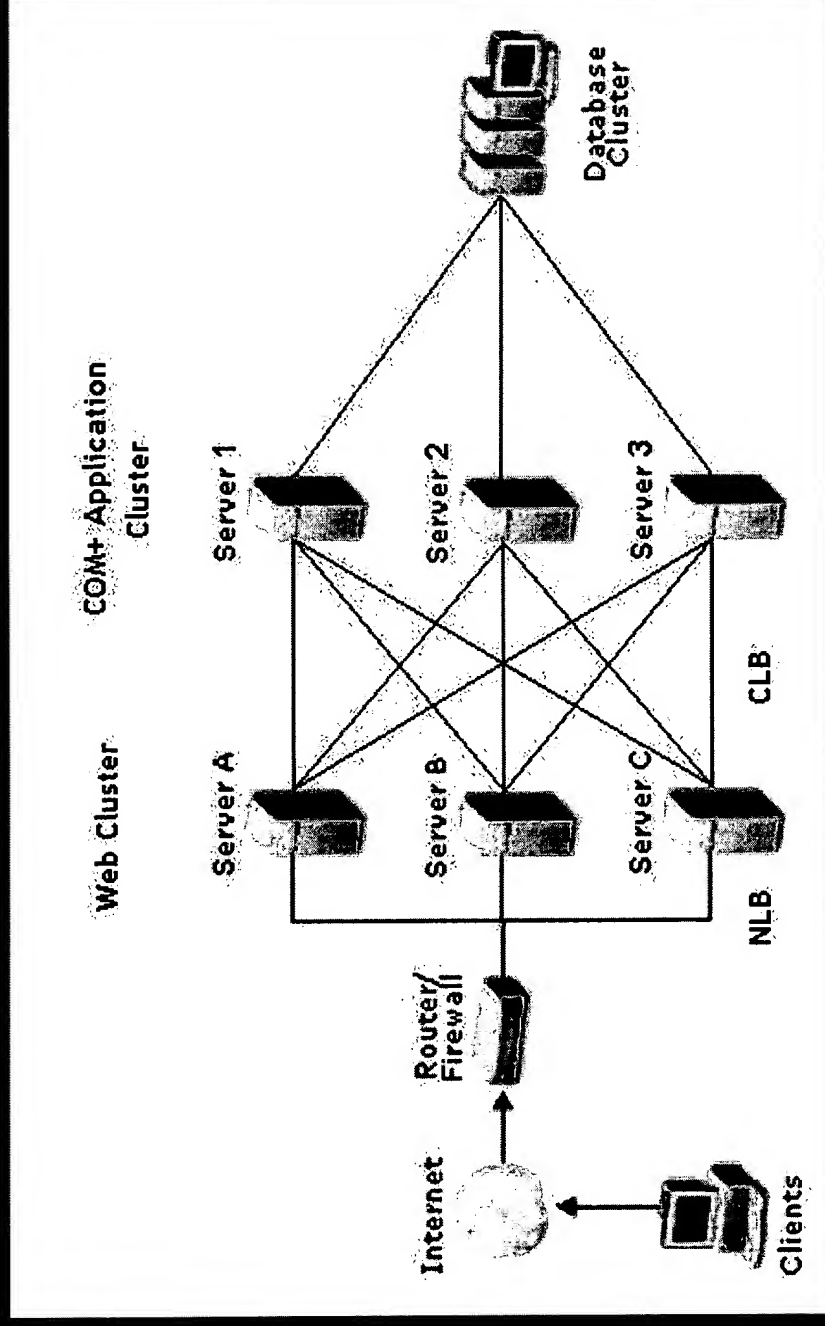
# Platform Support

- WinDNA 2000
  - Win2K Server, Advanced, DataCenter
  - IIS 5, Active Server Pages (ASP)
  - COM+ 1.0
  - WMI
- .NET
  - Load Balancing for Web Services, ASP+ integrated with application-level monitoring
  - Richer instrumentation of .NET framework
  - Easier instrumentation of .NET applications
  - More integration with Application Center

# Application Center Scenarios

- .COM's
- Hosting Providers & ASP's
- Intranet
- Web Services

# Application Center Topology



web + biz-logic + data  
tier tier tier

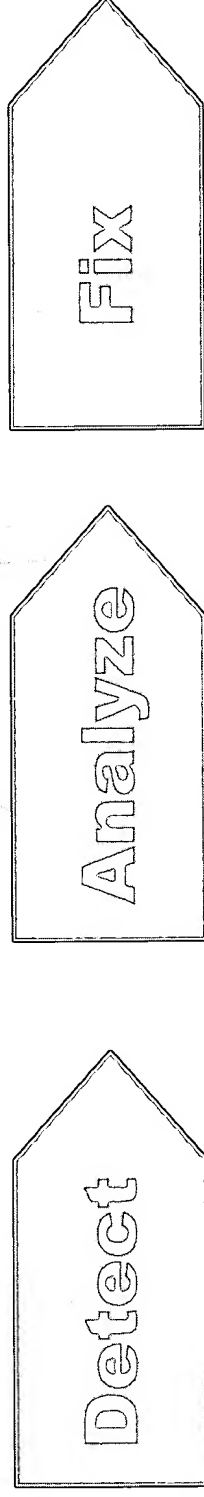


# Application Center 2000: High-Availability Architecture

- “Shared Nothing” clusters
  - No single point of failure
  - Application availability not affected if Cluster Controller fails
  - Fault-tolerant load balancing protects users from server or application failures
- Local Monitoring
  - Every server monitors itself
  - If critical failure detected, server can remove itself from load balancing
- Remote Monitoring
  - Rich application-level (HTTP, TCP/IP, etc.) and network level (ICMP, SNMP, etc.) remote monitoring

# Monitoring For Availability

Goal: Customers can access your site



WMI + Application Center

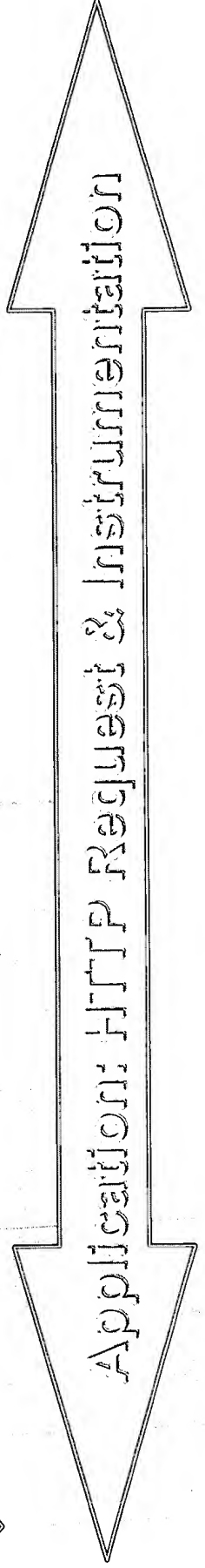
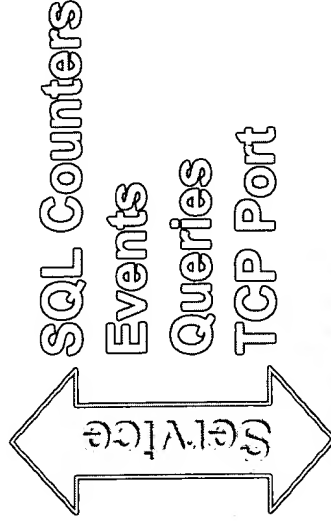
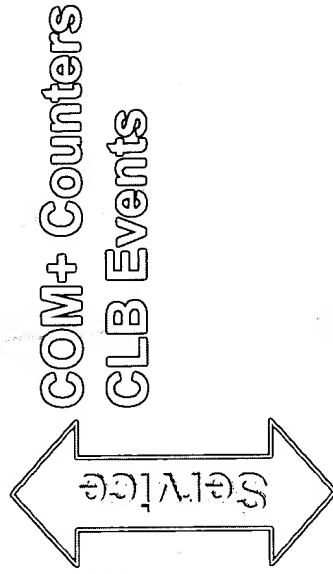
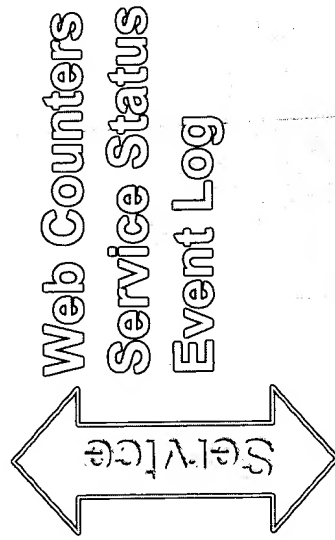
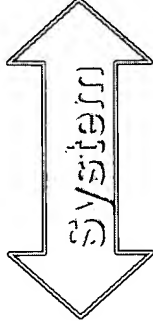
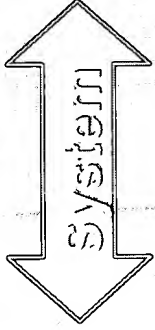
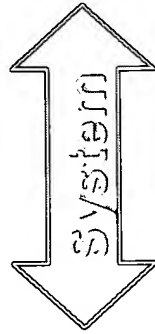
# Monitoring Health

Web Server

COM+

Database

System: Processor, Memory, Disk



# Demo: System Health

Detect

Analyze

Fix

- Create monitor for CPU overload
- Associate action
- Generate CPU load
- Health Monitor console
- E-mail to administrator

# Using Health Monitor

Health Monitor - [Health Monitor\All Monitored Computers]

Console Window Help

Action View Favorites

Tree Favorites

- Health Monitor
  - All Monitored Computers
    - ASUTOND-TEST
      - Actions
      - Non-Synchronized Monitors
      - Sample Monitors
      - Synchronized Monitors (Application Center)
        - Application Center Monitors
        - Online/Offline Monitors
          - W3Svc monitor
          - System Monitors
            - Processor
            - Web Site Monitors
            - Home Page verification

Details Statistics

Children of All Monitored Computers

Name	Status	Domain	OS	WMIVersion	Normal	Warning	Critical
ASUTOND-TEST	Critical	REDMOND	Microsoft ...	1.50.1085...	1	0	1

1 Items

Alerts for All Monitored Computers and its children

Severity	ID	Date/Time	Data Collector	Computer
Reset	102	6/3/2000 3:54:37 PM	Processor	ASUTOND-TEST
Critical	302	6/3/2000 3:54:37 PM	Home Page verification	ASUTOND-TEST
Reset	301	6/3/2000 3:54:37 PM	Home Page verification	ASUTOND-TEST
Reset	201	6/3/2000 3:55:07 PM	W3Svc monitor	ASUTOND-TEST

0 Items

# Data Collectors

- ☐ Perf counter
- ☐ Event Log
- ☐ Service/Process
- ☐ COM+ Application
- ☐ HTTP requests
- ☐ File or Directory
- ☐ Ping
- ☐ TCP/IP port connect
- ☐ WMI instance, event and data queries

**Performance Monitor Properties** [?] [X]

**General** | **Details** | **Actions** | **Schedule**

Specify the Windows NT Performance Monitor data to monitor (for example, the amount of available disk space on a logical disk).

Object:

Counter: 

☐ APcBypassesPerSec  
☐ DPCBypassesPerSec  
☐ DPCRate  
☐ DPCsQueuedPerSec  
☐ InterruptsPerSec  
☐ name  
☐ PercentDPCTime

Instance:

☐ Requires manual reset to return to normal

# Schedule

- Collection Times
- Interval
- Average

**Processor Properties** [?] [X]

General Details Actions **Schedule**

Specify when, and how often, to collect data. You can also specify how many data samples are used to calculate the average value.

**Collection days**

<input checked="" type="checkbox"/> Sunday	<input checked="" type="checkbox"/> Monday	<input checked="" type="checkbox"/> Tuesday	<input checked="" type="checkbox"/> Wednesday
<input checked="" type="checkbox"/> Thursday	<input checked="" type="checkbox"/> Friday	<input checked="" type="checkbox"/> Saturday	

**Collection times**

☒ All day

☐ Only from: 12:57 PM to 12:57 PM

☐ All day except: 12:57 PM to 12:57 PM

**Collection interval**

Collect every: 60 seconds

Total samples for average calculation: 6

OK Cancel Apply Help

# Thresholds

- ❑ Single property
- ❑ Current value, average, change
- ❑ Single or multiple occurrences
- ❑ State change
- ❑ Fires WMI Event

The screenshot shows the 'Threshold Properties' dialog box with the 'General' tab selected. The 'Expression' field contains '[Performance Monitor]'. The 'In monitoring' section is empty. The 'If this condition is true:' section contains the expression '[RealNumber]PercentProcessorTime' and the comparison 'Is greater than' with a value of '90'. The 'Duration' section has the radio button for 'Any time this occurs' selected, and the 'At least' option is set to '6' times in a row. The 'The following will occur' section contains the text 'The status changes to Critical'. The 'OK', 'Cancel', 'Apply', and 'Help' buttons are at the bottom.

Threshold Properties

General Expression Message Actions

Specify the condition that must be true to change the status of this item. If an action is associated with the change in status, that action will be run.

In monitoring: [Performance Monitor]

If this condition is true:

If the current value for [RealNumber]PercentProcessorTime Is greater than 90

Duration:

☐ Any time this occurs

☒ At least 6 times in a row (2 mins)

The following will occur:

The status changes to Critical

OK Cancel Apply Help



# Actions

- ☐ E-Mail
- ☐ Text log
- ☐ Windows log
- ☐ Command line
- ☐ Script

**Performance Monitor Properties**

General Details Actions Schedule

Specify the actions to run when the status of this item changes.

**Execute Action Properties**

Specify the action to execute when the state changes to the selected condition. You may also specify the throttle and reminder times.

Action to execute: Mail ACS Admin

Execution condition

☐ Normal ☐ Warning ☒ Critical

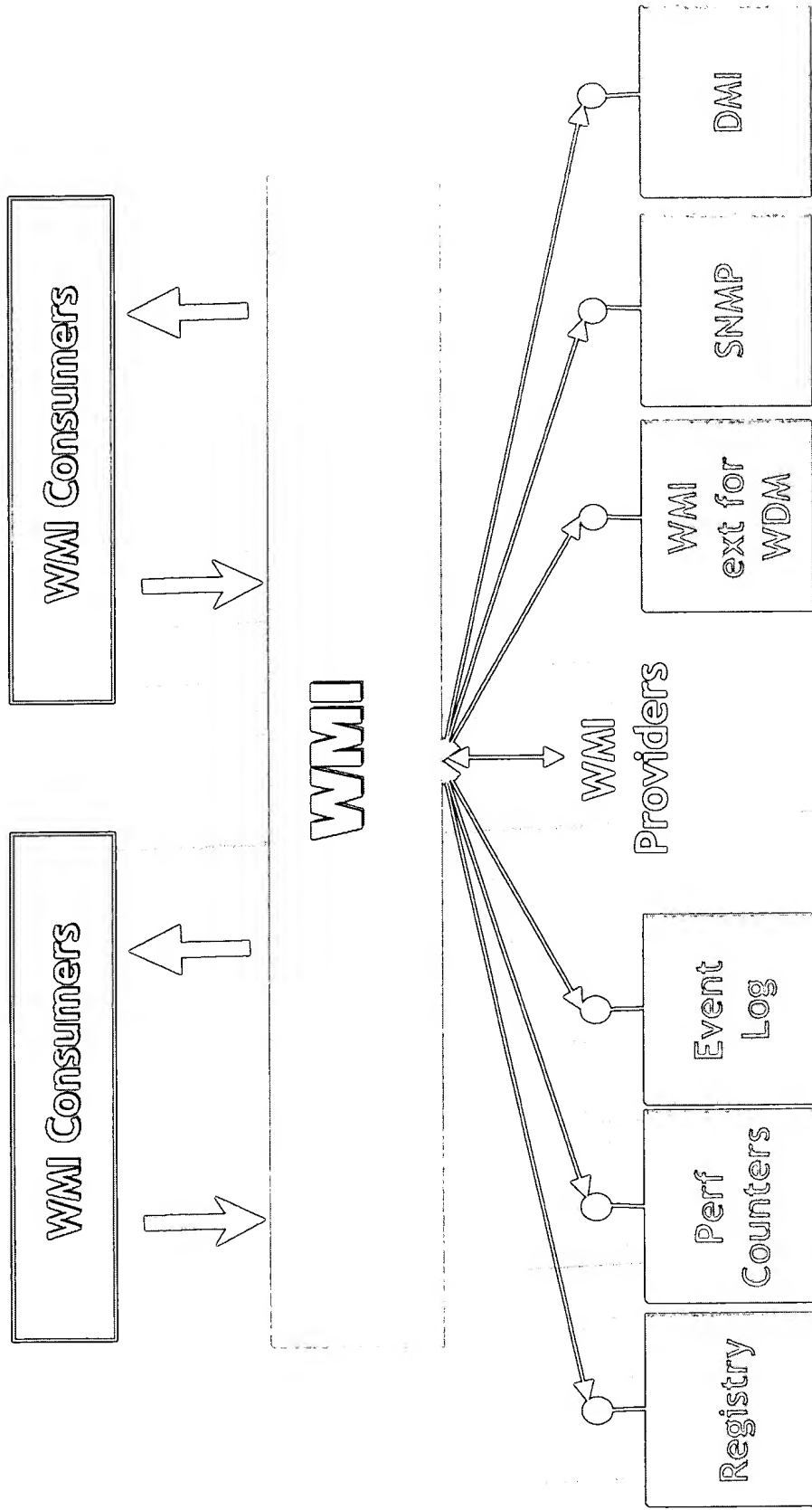
☐ No data ☐ Disabled

Throttle: 0 Second(s)

Reminder: 60 Second(s)

OK Cancel Help

# WMI Overview



# WMI Queries

All CIM objects are queryable

```
WbemServices: ExecQuery  
("select * from Win32LogicalDisk  
  where Win32LogicalDisk.Freespace < 2000000")
```

SQL subset w/ new terms

Extensions for Discovery/Traversal of Schema relationships

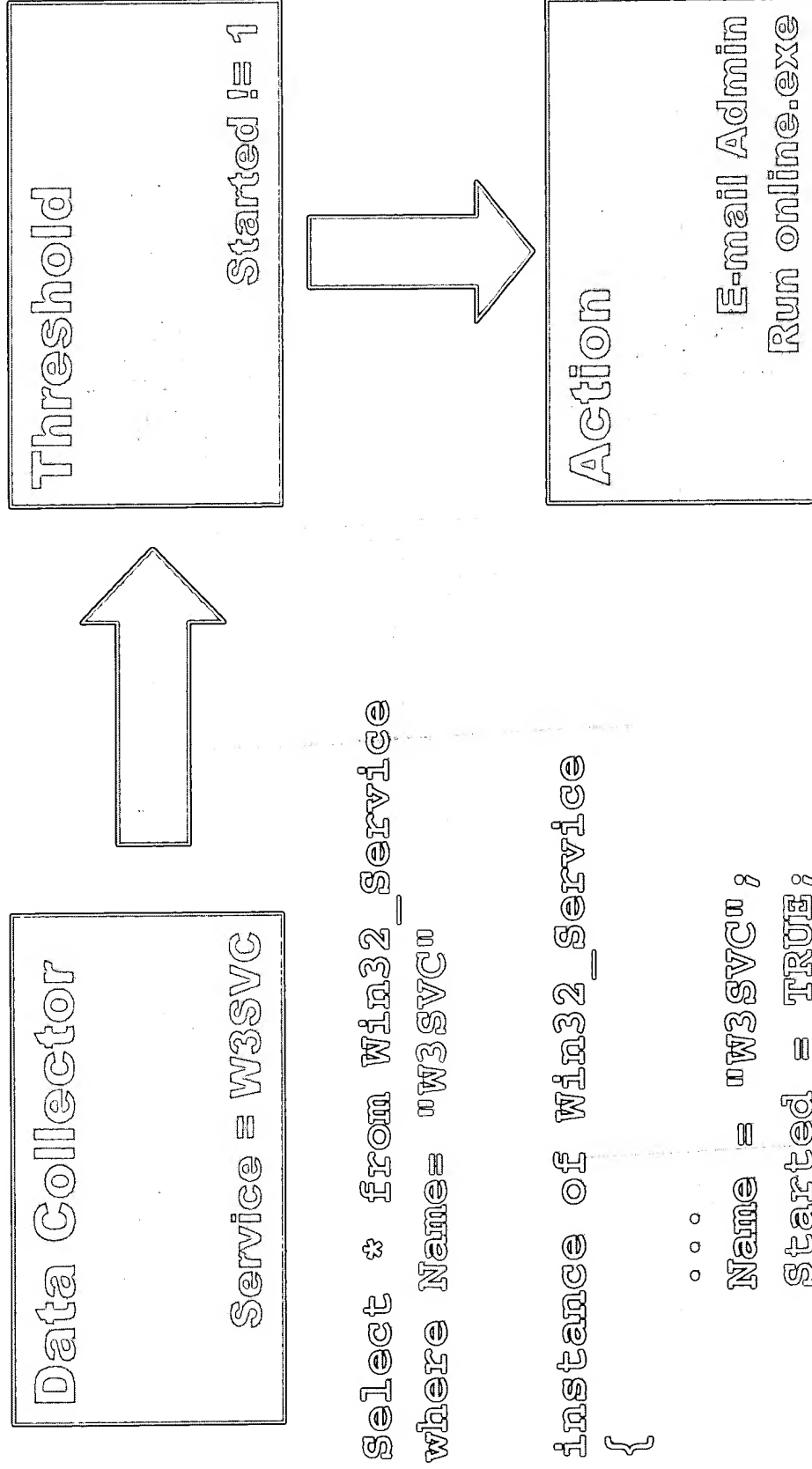
```
WbemServices: ExecQuery  
("Associators of {Win32_Service = 'DHCP'}")
```

Event filtering (thresholds, aggregation, inheritance)

```
within XXXX -- for specifying the tolerance for event delay  
isa -- registration applies to all events from class (incl. derived classes)  
within XXXX (within group by clause) -- specifies aggregation  
  interval  
select * from __InstanceModificationEvent within 5  
where TargetInstance isa Win32_LogicalDisk  
group by DriveLetter  
within 10 having count > 25
```

Tip: use wbemtest or CIM Studio

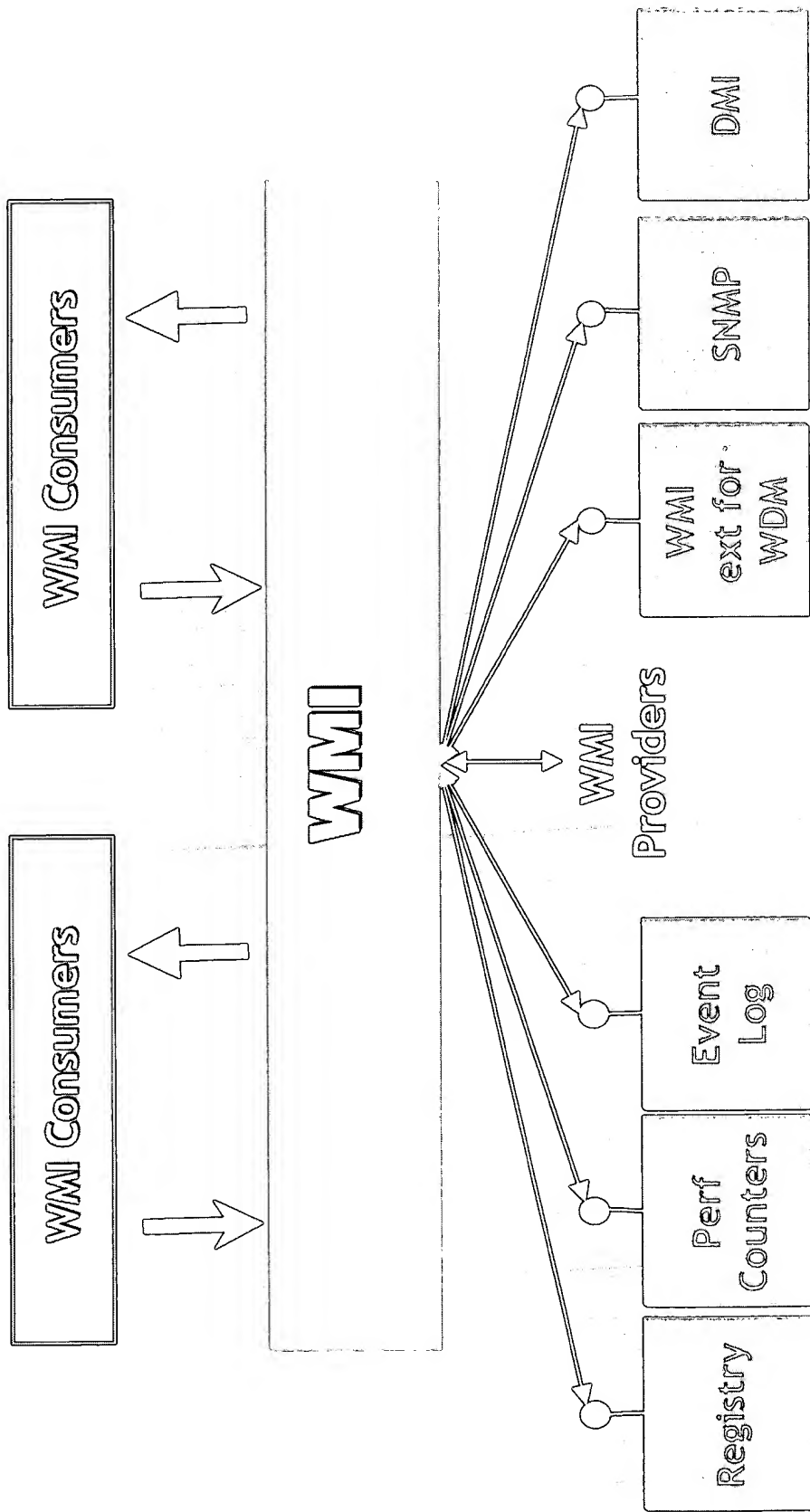
# Health Monitor Data Flow



```
select * from Win32_Service  
where Name= "W3SVC"
```

```
instance of Win32_Service  
{  
    ...  
    Name = "W3SVC";  
    Started = TRUE;  
    State = "Running";  
    ...  
};
```

# WMI Overview



# WMI Overview

WMI

Health  
Monitor  
Agent

Email

Script

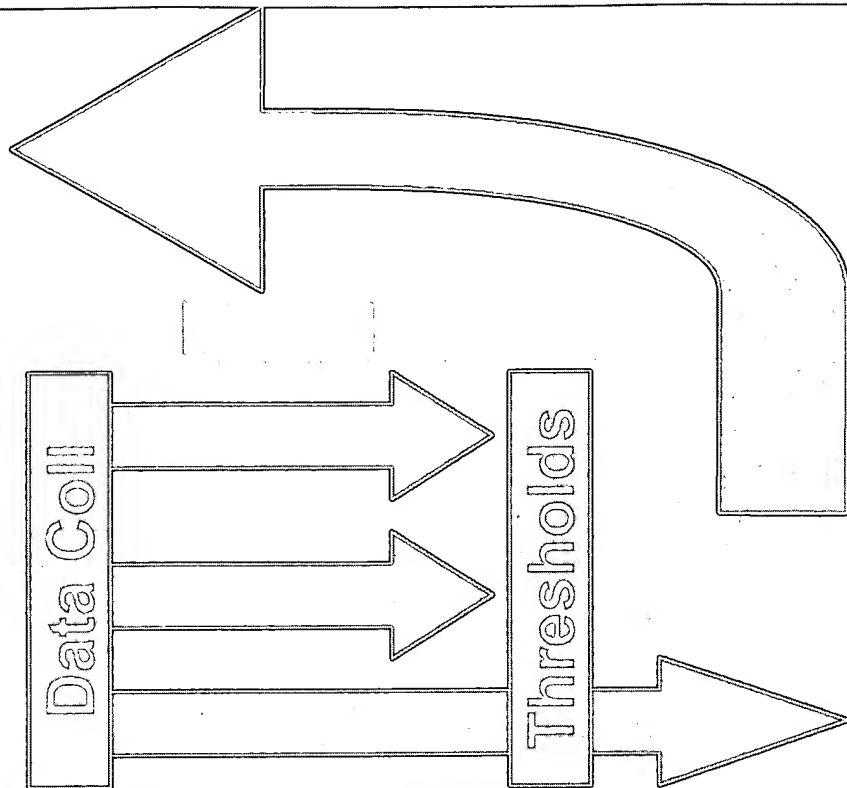
Data Coll

Thresholds

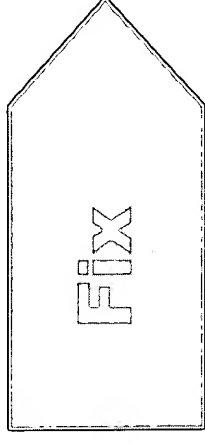
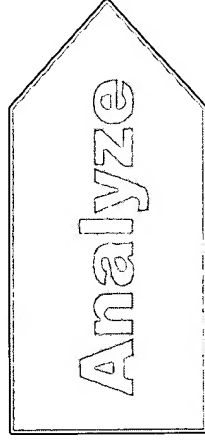
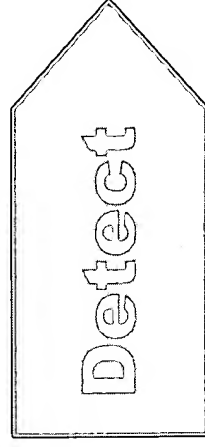
Perf  
Mon

HTTP

Event  
Log

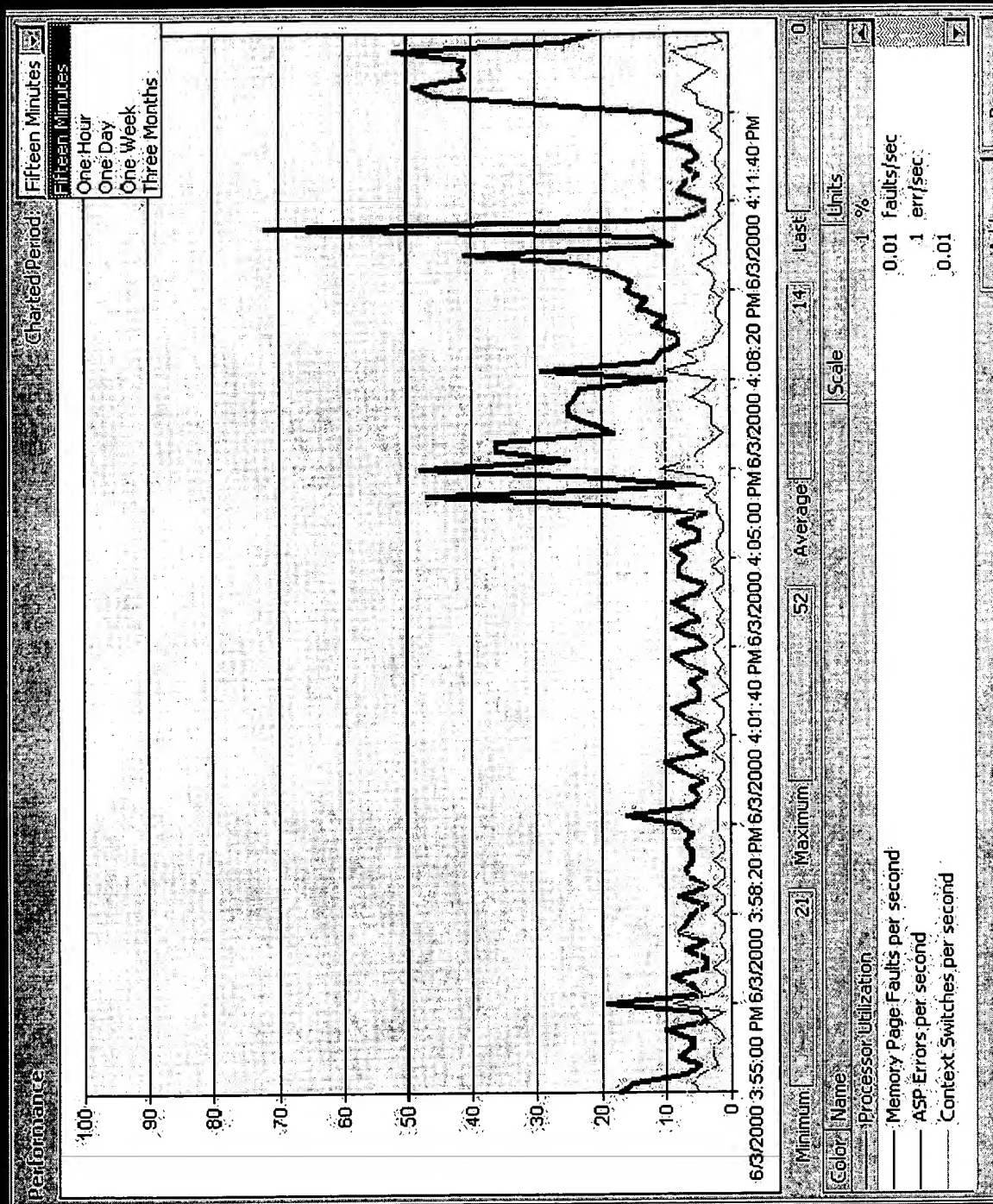


# Demo: System Health



- Monitor for CPU spikes
- Generate CPU load
- Application Center Perf Viewer
- Application Center Event Viewer
- Application Center Monitor Viewer

# Performance Counters





# Unified Event Log

Events <span>Help</span>			
Product:	Type:	Source:	Event ID:
All	Errors and warnings		Filter
Date	Time	Server	Description
6/3/2000	4:29:44 PM	ASUTTON0-TES Service Control Man	7032 Windows - System
6/3/2000	4:29:30 PM	ASUTTON0-TES Perf	2002 Windows - Application
6/3/2000	4:29:27 PM	ASUTTON0-TES DCOM	10010 Windows - System
6/3/2000	4:29:22 PM	ASUTTON0-TES Home Page verificati	302 Health Monitor - Page Returned an error
6/3/2000	4:29:17 PM	ASUTTON0-TES Service Control Man	7023 Windows - System
6/3/2000	3:54:50 PM	ASUTTON0-TES Cluster	4036 Application Center - Indicates that the cluster
6/3/2000	3:54:37 PM	ASUTTON0-TES Home Page verificati	302 Health Monitor - Page Returned an error
6/3/2000	3:54:36 PM	ASUTTON0-TES IISInfoCtrs	1003 Windows - Application
6/3/2000	3:54:36 PM	ASUTTON0-TES W3Svc monitor	201 Health Monitor - W3Svc Stopped/Started
6/3/2000	3:54:36 PM	ASUTTON0-TES Monitoring	8022 Application Center -
6/3/2000	3:54:36 PM	ASUTTON0-TES Monitoring	8022 Application Center -
6/3/2000	3:54:36 PM	ASUTTON0-TES Monitoring	8022 Application Center -
6/3/2000	3:54:35 PM	ASUTTON0-TES Monitoring	8022 Application Center -
6/3/2000	3:54:35 PM	ASUTTON0-TES IISInfoCtrs	1003 Windows - Application

**X** 6/3/2000 3:54:50 PM ASUTTON0-TEST

Application Center

Source: Cluster Loadbalancing

The server was not brought online because monitor state is critical.

[View troubleshooting information for this event](#)

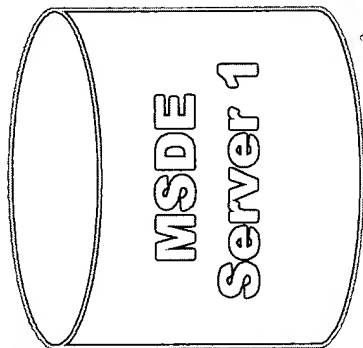
[Visit Microsoft Support Online for support information \(KB articles, etc.\) for this event](#)

# Cluster-Wide View

Events

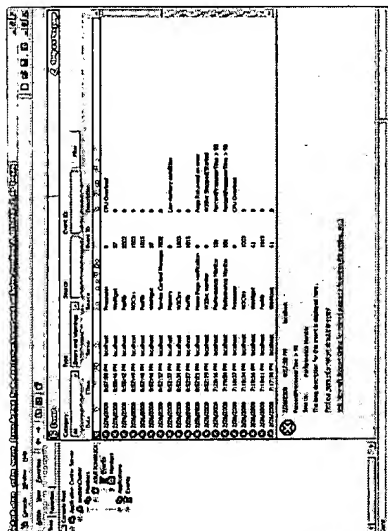
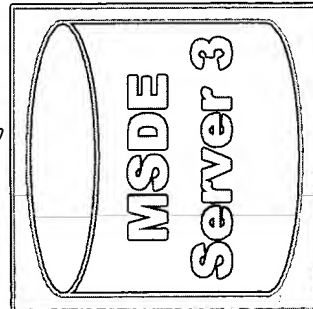
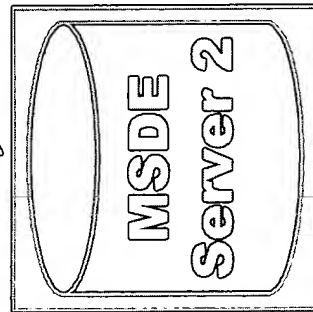
Performance

## Cluster Controller



AC Admin

Rollup  
Component

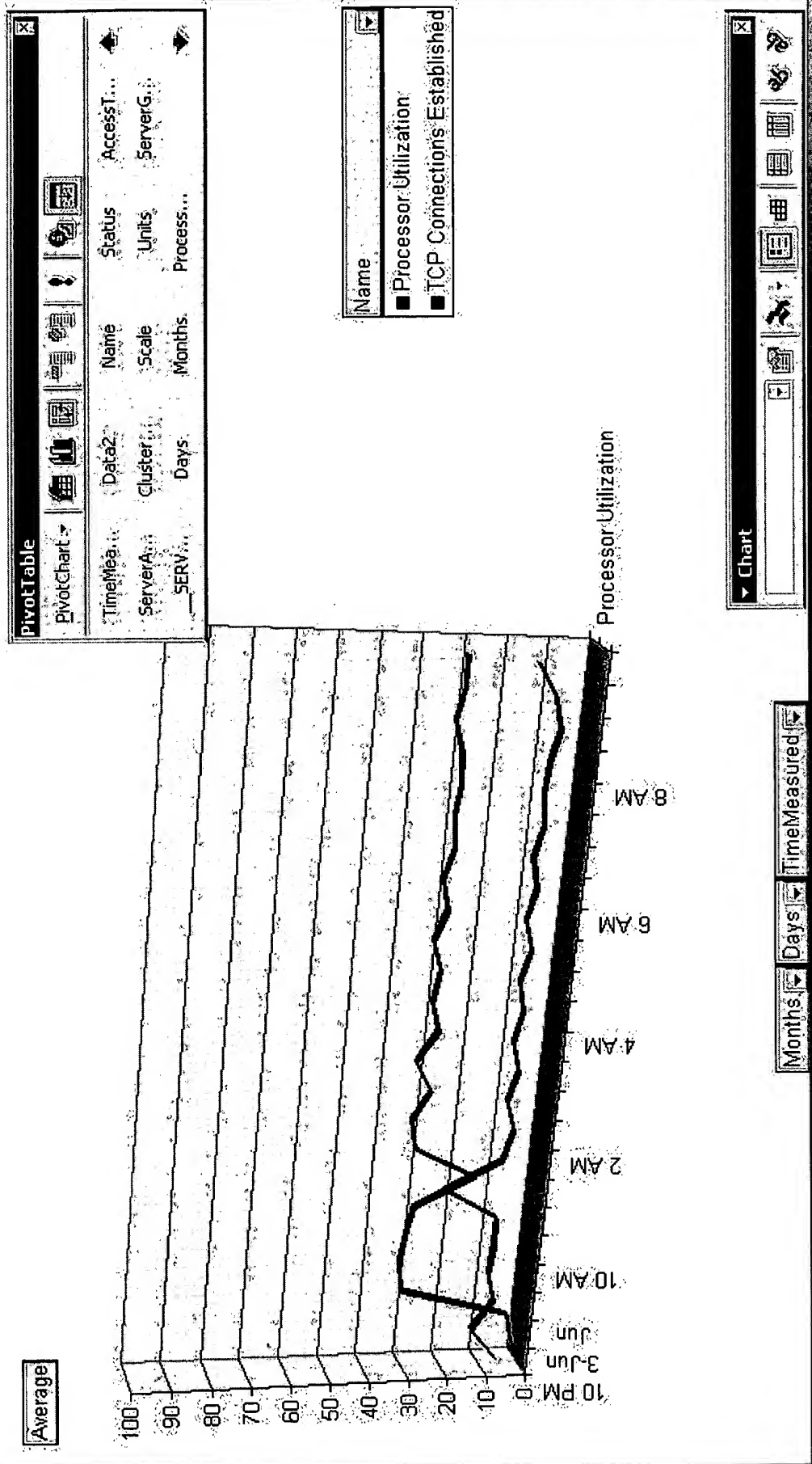


Component Name	Component Type	Component State	Component Details
Cluster	Cluster	Online	Cluster Name: Cluster1
Cluster Services	Cluster Service	Online	Cluster Service Name: Cluster1
Cluster Quorum Disk	Cluster Quorum Disk	Online	Cluster Quorum Disk Name: Cluster1
Cluster Name	Cluster Name	Online	Cluster Name: Cluster1
Cluster Network	Cluster Network	Online	Cluster Network Name: Cluster1
Cluster Storage	Cluster Storage	Online	Cluster Storage Name: Cluster1
Cluster Security	Cluster Security	Online	Cluster Security Name: Cluster1
Cluster Monitoring	Cluster Monitoring	Online	Cluster Monitoring Name: Cluster1
Cluster Configuration	Cluster Configuration	Online	Cluster Configuration Name: Cluster1
Cluster Health	Cluster Health	Online	Cluster Health Name: Cluster1
Cluster Status	Cluster Status	Online	Cluster Status Name: Cluster1
Cluster Events	Cluster Events	Online	Cluster Events Name: Cluster1
Cluster Performance	Cluster Performance	Online	Cluster Performance Name: Cluster1
Cluster Logs	Cluster Logs	Online	Cluster Logs Name: Cluster1
Cluster Settings	Cluster Settings	Online	Cluster Settings Name: Cluster1
Cluster Properties	Cluster Properties	Online	Cluster Properties Name: Cluster1
Cluster Details	Cluster Details	Online	Cluster Details Name: Cluster1
Cluster Information	Cluster Information	Online	Cluster Information Name: Cluster1
Cluster Summary	Cluster Summary	Online	Cluster Summary Name: Cluster1
Cluster Overview	Cluster Overview	Online	Cluster Overview Name: Cluster1
Cluster History	Cluster History	Online	Cluster History Name: Cluster1
Cluster Activity	Cluster Activity	Online	Cluster Activity Name: Cluster1

# Log Access Possibilities

\_SERVER (All)

## Cluster Performance Counters



# Monitoring Extensibility

- Application Center WMI Provider
- Extract Application Center logs
- Query and reporting tools
- 3<sup>rd</sup> party monitoring tools
- WMI event consumer

# Demo: Application Availability

Detect

Analyze

Fix

- ❑ Create HTTP Monitor
- ❑ Web Service Monitor
- ❑ Associate Action
- ❑ Stop web service on member
- ❑ Monitors fail and state goes critical
- ❑ Action takes server offline
- ❑ E-mail admin and alert in event log

# Application Availability

- Monitors can control load balancing
  - If monitor fails, server goes offline
  - Default Application Center rule
- Scriptable to extend behavior
- Beware taking all servers offline
  - Redirect page if database error
  - Or custom scripts

# Web Page Monitors

- ☐ URL
- ☐ Timeout
- ☐ Authentication
- ☐ HTTP Method
- ☐ Post Data
- ☐ Custom Headers

The screenshot shows the 'HTTP Monitor Properties' dialog box with the 'HTTP Advanced Options' tab selected. The dialog has a title bar with a question mark and close button. Below the title bar are three tabs: 'General', 'Details', and 'Schedule'. The 'General' tab is active, displaying a message: 'You can specify specific login information or information to send to a Web server to ensure that the server is processing forms correctly.' Below this message are three sections: 'HTTP method:' with a dropdown menu showing 'GET'; 'Follow HTTP redirects:' with a checked checkbox; and 'Form POST data:' with an empty text area. At the bottom, there is a section for 'Extra HTTP headers:' with another empty text area. The dialog concludes with two rows of buttons: 'OK', 'Cancel', and 'Help' in the first row; and 'OK', 'Cancel', 'Apply', and 'Help' in the second row.

HTTP Monitor Properties

General Details Actions Schedule

HTTP Advanced Options

You can specify specific login information or information to send to a Web server to ensure that the server is processing forms correctly.

HTTP method: GET

☒ Follow HTTP redirects

Form POST data:

Extra HTTP headers:

OK Cancel Help

OK Cancel Apply Help

# Web Page Monitors

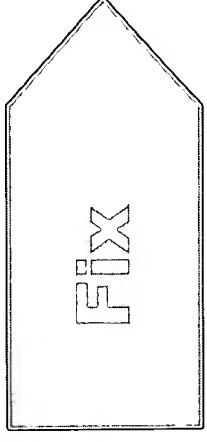
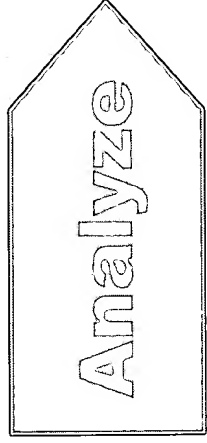
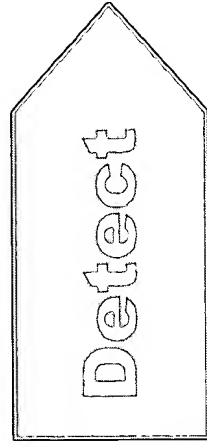
- Response Properties
  - Status code, response time, last modified
  - Text response, binary response, headers
  - Content length, received bytes
- Actions
  - Take offline
  - Redirect to a different page
  - Check other monitors
  - Run a script



# Database Monitors

- Database health
  - Performance Counters and Events
  - SQL DMO Provider
- Connectivity to the server
  - TCP/IP port connect
- Successful query
  - ASP page

# Database Monitoring Script

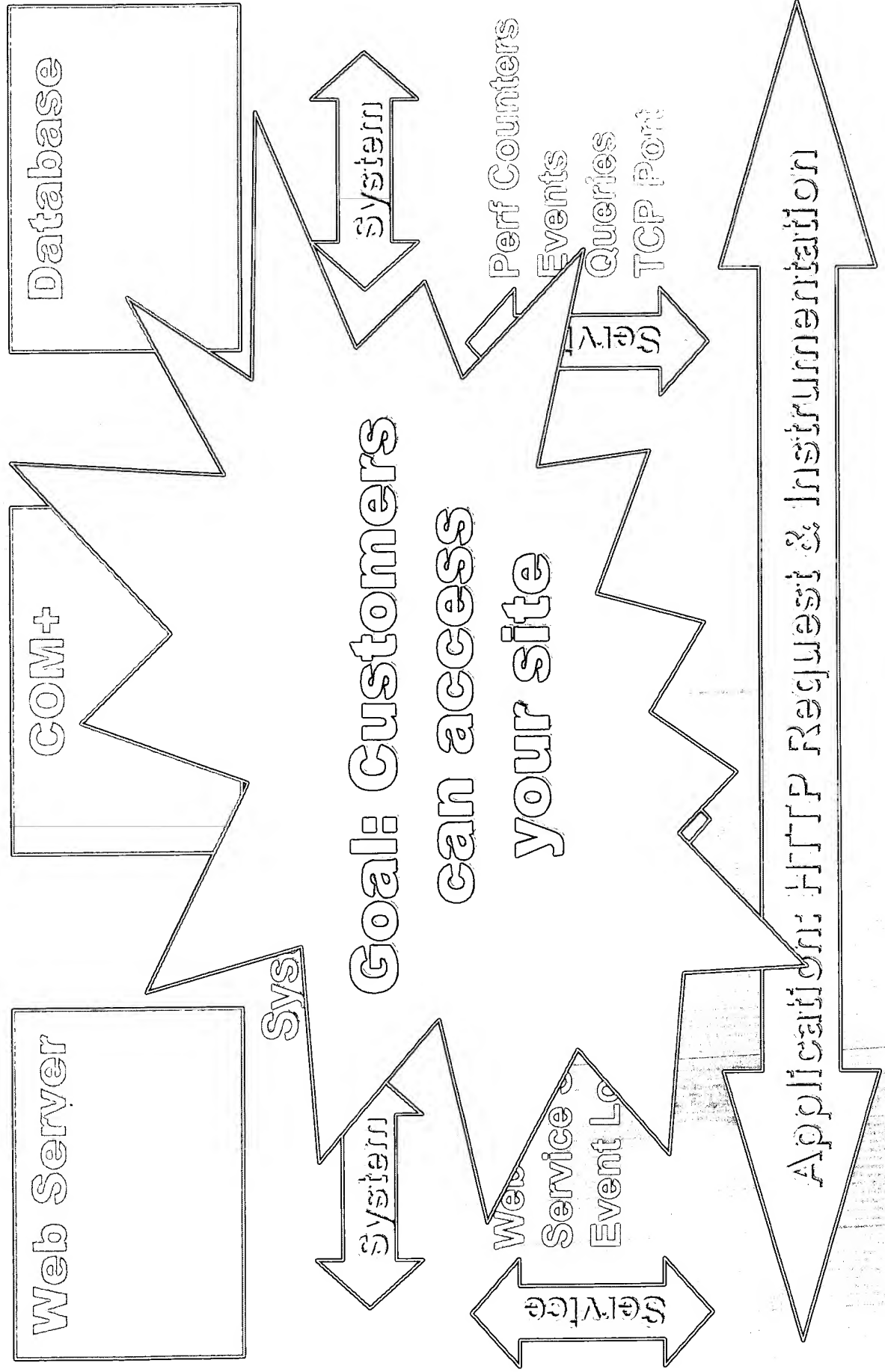


- Demo ASP database monitor

# COM+ Statistics Provider

- ❑ Execution metrics
  - ❑ Total committed transactions and per sec
  - ❑ Total aborted transactions and per sec
  - ❑ Total object creations and per sec
  - ❑ Total object activations and per sec
  - ❑ Shutdowns: total, timeout, admin, failure
  - ❑ Object pool timeouts
- ❑ Win32\_Process statistics (dllhost.exe)
  - ❑ Handles, working set, page faults, processor time...

# Monitoring Health



# Application Center Monitoring

- Health Monitor Integration
  - Monitoring samples
  - Load balancing control
  - Replication of monitors and time
  - Operators view
- Cluster-wide event log
- Cluster-wide performance counters

# Best Practices

Detect

Analyze

Fix

- ❑ Instrumentation
  - ❑ HTTP, ping and port connect monitors
  - ❑ PerfMon and Event Log
  - ❑ WMI Provider
- ❑ Monitor application health
  - ❑ What does availability mean to you?
  - ❑ Baseline performance
  - ❑ Watch out for false positives

# Call to Action

- Install Application Center Beta 1 !
- Monitor and instrument your applications
- Develop an operations plan
- Understand WMI

# Related Sessions And References

- Other PDC sessions recommended
  - *Load-Balancing .NET Platform Applications with Application Center 2000*  
(2-315, Room 311, 9/12/00, 2:45 p.m. Ori Amiga)
  - *Using WMI to Build Management into .NET Platform Applications*  
(3-344, Room 304, 9/12/00, 2:45 p.m. Corina Feuerstein; Travis Muhlestein; Stephen Todd)
  - *Scaling out the Data Tier with Shared Nothing Clustering Technology in SQL Server 2000 and Beyond*  
(2-328, Room 109, 9/13/00, 5:30 p.m., Pedro Cells)
- References
  - <http://www.microsoft.com/applicationcenter>
  - WMI Reference: Platform SDK, Management Services



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